

POSITIONS AND AREAS OF SUN SPOTS

[Communicated by Capt. J. F. Hellweg, Superintendent U. S. Naval Observatory. Data furnished by Naval Observatory, in cooperation with Harvard, Yerkes, Perkins, and Mount Wilson Observatories. The differences of longitude are measured from central meridian, positive west. The north latitudes are plus. Areas are corrected for foreshortening and are expressed in millionths of sun's visible hemisphere. The total area, including spots and groups, is given for each day in the last column.]

| Date | Eastern stand- ard civil time | Heliographic | | | Area | | Total area for each day |
|---------------------------------|--|----------------|----------------|---------------|------|-------|-------------------------------------|
| | | Diff. long. | Longi- tude | Lat- itude | Spot | Group | |
| 1931 | | | | | | | |
| | <i>h m</i> | <i>°</i> | <i>°</i> | <i>°</i> | | | |
| May 1 (Naval Observatory)----- | 11 21 | +60.0 | 273.2 | +15.0 | | 46 | 46 |
| May 2 (Naval Observatory)----- | 14 10 | +72.0 | 270.5 | +18.0 | 46 | | 46 |
| May 3 (Naval Observatory)----- | 11 18 | -52.0 | 134.8 | +27.0 | 3 | | 3 |
| | | -38.0 | 148.8 | +2.0 | 19 | | 22 |
| May 4 (Naval Observatory)----- | 11 16 | +60.5 | 234.1 | -10.0 | | 46 | 46 |
| May 5 (Naval Observatory)----- | 10 52 | -7.5 | 183.1 | +10.5 | 22 | | 22 |
| May 6 (Naval Observatory)----- | 10 49 | -17.0 | 130.4 | -2.0 | 3 | | 3 |
| | | +9.0 | 156.4 | +11.0 | 31 | | 34 |
| May 7 (Naval Observatory)----- | 13 16 | -70.0 | 62.9 | +5.0 | | 123 | 123 |
| | | +22.0 | 154.9 | +13.0 | 15 | | 138 |
| May 8 (Naval Observatory)----- | 10 48 | -61.0 | 60.0 | +5.0 | | 108 | 108 |
| | | -49.0 | 72.0 | +2.0 | 6 | | 114 |
| May 9 (Naval Observatory)----- | 10 59 | -50.0 | 57.7 | +7.5 | | 185 | 185 |
| May 10 (Naval Observatory)----- | 10 59 | -37.5 | 57.0 | +9.0 | | 216 | 216 |
| | | -1.0 | 93.5 | +34.0 | 9 | | 9 |
| | | +40.0 | 134.5 | +1.5 | | 123 | 348 |
| May 11 (Naval Observatory)----- | 11 27 | -21.0 | 60.0 | +8.5 | | 154 | 154 |
| | | +55.0 | 136.0 | +1.5 | | 77 | 231 |
| May 12 (Mount Wilson)----- | 11 30 | -8.0 | 59.7 | +9.0 | | 121 | 121 |
| | | -7.0 | 60.7 | +7.0 | 133 | | 133 |
| | | +41.0 | 108.7 | +5.0 | | 5 | 5 |
| | | +71.0 | 138.7 | -1.0 | 161 | | 420 |
| May 13 (Mount Wilson)----- | 9 40 | +4.0 | 59.4 | +8.0 | | 99 | 99 |
| | | +4.0 | 59.4 | +7.0 | 124 | | 124 |
| | | +55.0 | 110.4 | +5.0 | | 6 | 6 |
| | | +87.0 | 142.4 | +0.5 | 51 | | 280 |
| May 14 (Naval Observatory)----- | 11 5 | +20.0 | 61.5 | +10.0 | | 139 | 139 |
| May 15 (Naval Observatory)----- | 12 22 | -71.0 | 316.6 | +8.5 | 31 | | 31 |
| | | -60.0 | 327.6 | -17.5 | 31 | | 31 |
| | | -13.0 | 14.6 | -6.0 | 3 | | 3 |
| | | +34.0 | 61.6 | +10.5 | | 216 | 281 |
| May 16 (Naval Observatory)----- | 10 45 | -65.0 | 310.2 | +11.0 | | 6 | 6 |
| | | -50.0 | 325.2 | -17.5 | | 170 | 170 |
| | | -2.5 | 12.7 | +11.0 | 3 | | 3 |
| | | +47.0 | 62.2 | +10.5 | | 185 | 364 |

Positions and areas of sun spots—Continued

| Date | Eastern stand- ard civil time | Heliographic | | | Area | | Total area for each day |
|----------------------------|--|----------------|----------------|--------------|------|-------|-------------------------------------|
| | | Diff. long. | Longi- tude | Lat- tude | Spot | Group | |
| 1931 | | | | | | | |
| | h m | ° | ° | ° | | | |
| May 17 (Naval Observatory) | 10 55 | -60.5 | 301.4 | +15.0 | 8 | | 108 |
| | | -37.5 | 324.4 | -14.0 | | | |
| | | -9.5 | 352.4 | +14.0 | 3 | | |
| | | +60.0 | 61.9 | +11.0 | | | 77 |
| May 18 (Naval Observatory) | 10 54 | -23.0 | 325.7 | -16.0 | | | 201 |
| | | -2.5 | 346.2 | +11.0 | 15 | | |
| | | +73.0 | 61.7 | +12.0 | | | 93 |
| May 19 (Naval Observatory) | 10 55 | -10.0 | 325.5 | -15.0 | | | 262 |
| | | +14.0 | 349.5 | +11.0 | 6 | | |
| May 20 (Naval Observatory) | 11 5 | +2.5 | 324.6 | -15.5 | | | 401 |
| | | +62.0 | 24.1 | +17.5 | 3 | | |
| May 21 (Naval Observatory) | 13 12 | -60.0 | 247.8 | +12.0 | | | 15 |
| | | +11.0 | 318.8 | -5.0 | | | |
| | | +18.0 | 325.8 | -15.0 | | | 376 |
| May 22 (Naval Observatory) | 11 8 | -40.5 | 355.2 | +10.5 | 3 | | |
| | | -10.0 | 325.7 | +10.5 | | | 9 |
| | | +31.0 | 326.7 | -13.0 | | | 31 |
| May 23 (Naval Observatory) | 11 19 | -30.0 | 252.3 | +11.5 | | | 31 |
| | | +3.0 | 285.3 | +10.5 | | | 46 |
| | | +43.0 | 325.3 | -13.0 | | | 247 |
| May 24 (Naval Observatory) | 11 27 | -15.0 | 354.1 | +10.5 | | | 31 |
| | | +18.0 | 287.1 | +11.0 | | | 62 |
| | | +37.0 | 326.7 | -13.0 | | | 324 |
| May 25 (Naval Observatory) | 11 11 | -2.5 | 253.4 | +10.5 | | | 46 |
| | | +30.0 | 285.9 | +11.0 | | | 15 |
| | | +43.0 | 293.9 | -10.0 | | | 31 |
| May 26 (Naval Observatory) | 10 59 | +70.0 | 325.9 | +14.0 | 3 | | 108 |
| | | +8.5 | 251.3 | +18.0 | | | |
| | | +11.5 | 254.3 | +10.5 | | | 62 |
| | | -37.5 | 280.3 | +6.0 | | | 31 |
| May 27 (Naval Observatory) | 11 6 | -29.0 | 256.3 | +12.5 | | | 77 |
| | | -52.0 | 281.5 | +8.0 | | | |
| | | -30.0 | 309.5 | +6.0 | 3 | | 62 |
| May 28 (Naval Observatory) | 11 5 | -45.0 | 361.8 | +12.0 | | | 31 |
| | | -68.0 | 284.3 | +8.0 | 46 | | |
| May 29 (Naval Observatory) | 11 20 | -55.0 | 257.9 | +12.5 | | | 31 |
| | | -80.0 | 282.9 | +8.0 | | | |
| May 30 (Naval Observatory) | 11 54 | -80.0 | 109.4 | +2.5 | | | 108 |
| | | +67.0 | 256.4 | +16.0 | 31 | | |
| May 31 (Naval Observatory) | 10 51 | -70.0 | 106.7 | +5.0 | | | 93 |
| Mean daily area for May | | | | | | | |

AEROLOGICAL OBSERVATIONS

[The Aerological Division, W. R. GREEN in Charge]

By L. T. SAMUELS

Free-air temperatures for May were below normal in the lower levels and above normal in the upper levels except at Due West, where the departures decreased appreciably with altitude but remained negative at all levels. (Table 1.)

The relative humidity averaged above normal in the lower levels and mostly below normal in the upper levels.

Vapor pressure departures were in agreement with those for temperature, except that the former remained negative at all levels at Broken Arrow.

The data for Groesbeck have been omitted from Table 1, as kite observations were discontinued at that station on May 16.

Free-air resultant winds for the month at the 1,000-meter level were mostly westerly except on the Pacific coast, where they were very light and variable, and in the extreme southern part of the country, where they were mostly southerly and easterly. (Table 3.)

At 4,000 meters the resultant directions were westerly at practically all stations except in the extreme northern part of the country, where a pronounced northerly component prevailed. The highest resultant velocities at this level occurred over the upper Lakes and New England regions.

TABLE 1.—Free-air temperatures, relative humidities, and vapor pressures during May, 1931.

| Altitude (meters) m. s. l. | Broken Arrow, Okla. (233 meters) | | Due West, S. C. (217 meters) | | Ellendale, N. Dak. (444 meters) | | Royal Center, Ind. (225 meters) | |
|-------------------------------|--|-----------------------|------------------------------------|-----------------------|---------------------------------------|-----------------------|---------------------------------------|-----------------------|
| | TEMPERATURE (°C.) | | TEMPERATURE (°C.) | | TEMPERATURE (°C.) | | TEMPERATURE (°C.) | |
| | Mean | Departure from normal | Mean | Departure from normal | Mean | Departure from normal | Mean | Departure from normal |
| Surface | 16.6 | -3.1 | 18.5 | -1.8 | 11.4 | -1.7 | 14.9 | -1.2 |
| 500 | 15.0 | -2.8 | 16.9 | -0.9 | 10.9 | -1.8 | 12.5 | -0.9 |
| 1,000 | 12.9 | -2.7 | 14.5 | -0.4 | 8.7 | -0.8 | 10.0 | -0.2 |
| 1,500 | 11.0 | -2.4 | 11.2 | -0.6 | 6.7 | +0.1 | 7.4 | 0.0 |
| 2,000 | 8.4 | -2.4 | 8.1 | -0.8 | 5.1 | +1.5 | 4.8 | -0.2 |
| 2,500 | 5.4 | -2.6 | 5.2 | -0.9 | 2.2 | +1.9 | 2.6 | 0.0 |
| 3,000 | 2.9 | -2.0 | 2.4 | -0.7 | -0.2 | +1.9 | 0.3 | +0.5 |
| 4,000 | -1.0 | +0.3 | | | -5.6 | -2.4 | -4.1 | +2.2 |
| 5,000 | -5.2 | +1.4 | | | -11.6 | +2.5 | -9.3 | +2.8 |
| RELATIVE HUMIDITY (%) | | | | | | | | |
| Surface | 71 | +1 | 69 | +4 | 62 | +2 | 67 | +3 |
| 500 | 70 | +1 | 65 | 0 | 62 | +2 | 67 | +3 |
| 1,000 | 66 | -1 | 59 | -5 | 59 | 0 | 65 | +2 |
| 1,500 | 58 | -4 | 50 | -5 | 57 | -3 | 60 | -1 |
| 2,000 | 56 | -3 | 57 | -5 | 55 | -5 | 54 | -3 |
| 2,500 | 55 | -1 | 55 | -4 | 55 | -4 | 50 | -1 |
| 3,000 | 53 | -1 | 47 | -8 | 56 | -1 | 53 | +6 |
| 4,000 | 37 | -18 | | | 48 | -5 | 47 | +1 |
| 5,000 | 21 | -32 | | | 50 | -1 | 44 | +2 |